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## MELOID BEETLES (COLEOPTERA) OF THE WEST INDIES

By RICHARD B. SELANDER AND JOHN K. BOUSEMAN<sup>1</sup>

### Introduction

The West Indies have never received attention from entomologists commensurate with their great biogeographical interest. Descriptions of West Indian species of Meloidae have appeared at irregular intervals since the first species was described by Fabricius in 1781, but no attempt has been made to treat these beetles comprehensively or to relate them to the beetle fauna of the American mainland. We therefore feel that the present report will be valuable, for by bringing together all available information on the Meloidae of the West Indies, the report will not only serve as a means of identifying the species of the islands but will perhaps also stimulate more widespread interest in the meloid fauna, so that the process of studying and interpreting it will be accelerated.

For the purpose of this report the West Indies are defined as including the Bahama Islands, the Greater Antilles, and the Lesser Antilles as far south as Grenada. Trinidad and the other islands associated with it along the northern coast of South America, while forming part of the West Indies in the physiographic sense, are excluded because they are on biogeographic grounds more logically treated as part of South America.

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from the island of Trinidad. Five of the species of the Greater Antilles are not present in the Lesser Antilles, but there are no species in the latter group of islands that do not occur in the former. Apparently the only island having endemic species is Cuba, with three. We do not propose to enter into a detailed comparison of the fauna of the various islands because the small number of species involved requires a more exact knowledge of the distribution of the fauna than we now have.

With respect to the origin of the West Indian meloid fauna, it is well first to discuss what information is available concerning the distributional and phylogenetic relationships of the individual species before summarizing our conclusions.

*Meloe laevis* and *Cissites maculata* not only occur in the Tropics of the American mainland but have related species in this area. Probably, *M. laevis* reached the West Indies from Central America, and *C. maculata* reached there from either Central or South America. The distribution of *M. laevis*, if it actually corresponds to that shown in table 1, presents an intriguing biogeographic problem. This species ranges on the mainland from southwestern United States south to Costa Rica, and is therefore evidently able to disperse with facility and to adapt to a relatively wide range of ecological conditions. On this account, the presence of this species in the West Indies is not surprising, but it is quite enigmatic that within this area the species should be apparently restricted to Hispaniola, which is among the islands farthest removed from the mainland.

Although *Nemognatha punctulata* is represented in the southeastern United States by a population only slightly differentiated from the West Indian population, the only species with which it shows a definite relationship are South American in distribution. The fact that it has not been recorded in the West Indies south of Jamaica suggests that it may not have reached the islands directly from South America but rather through colonization from Central America by an ancestral species that has since either become extinct in Central America or has escaped the notice of collectors.

The same reasoning applies to *Tetraonyx quadrimaculata*. This species is replaced in continental South America (Brazil) by a very similar species, *T. bimaculata* Klug. Like *N. punctulata*, *T. quadrimaculata* has a population in the southeastern United States but has no known relatives there. On this basis the simplest explanation for the distribution of the species is that it derived directly from a South American stock and reached the United States from the West Indies. The Cuban species *T. cruciata* and *T. maestra* represent local derivatives of *T. quadrimaculata*.

The species *Pseudozonitis marginata*, which is presumably restricted to the West Indies, has its nearest known relative in the Central American *P. megalops* (Champion). Inasmuch as *P. marginata* occurs as far north as Andros Island in the Bahamas and as far south as Grenada, its failure to colonize the mainland at either end of its range is likely the result of an inability to compete with the mainland fauna rather than of difficulty in crossing over to the mainland. *P. obscuricornis* belongs to a species group that is otherwise recorded only from the southwestern United States; however, the genus *Pseudozonitis* has not been thoroughly studied in the Neotropics, and very likely other related species will eventually be found in Mexico and Central America, if not in South America.

Finally, the relationships of the Cuban endemic *Nemognatha occupata* are so questionable that we prefer not to speculate on the origin of this species.

We conclude on the basis of the above analysis that the West Indian meloid fauna derived from seven immigrant species, most or perhaps all of which arrived on the islands from the neotropical part of the mainland. Central America seems to have been the important source region for West Indian Meloidae, although two of the species may have reached the islands directly from South America. We find nothing in the relationships and distribution of the Meloidae that is incompatible with the theory of origin of the West Indian fauna recently outlined by Darlington (1957).

#### DISPERSAL

One important aspect of the meloid fauna of the West Indies not mentioned in the preceding discussion concerns how Meloidae disperse themselves. This aspect is also of more general significance because it offers strong indirect support for the theory that the islands of the West Indies are oceanic.

As larvae Meloidae are parasitic either on grasshopper egg pods or the contents of nesting cells of wild bees; as adults they are phytophagous (except for a few species that do not feed). Various degrees of host specificity are exhibited by different species both in the larval and adult stages. Because of this general complexity of their ecology, the Meloidae face special problems of dispersal, and it is therefore to be expected that they would be poorly represented in any area having a history of prolonged isolation.

Significantly, 5 of the 9 New World genera of Meloidae whose first instar larvae reach their feeding site by phoresy on adult bees are represented in the West Indian fauna (*Zonitis*, *Rhyphonemognatha*, *Gnathium*, *Hornia*, and *Tricrania* are absent); none of the nearly 20 New World genera of nonphoretic meloids (such as *Lytta*, *Pyrota*, and the dominant genus *Epicauta*) occur there. Apparently, the West



Indies have always been separated from the American mainland by a barrier so formidable to Meloidae that phoresy has been a prerequisite to successful colonization of the islands. That only a few of the phoretic meloid species have established themselves in the West Indies does not detract from our hypothesis.

Phoresy as a means of dispersal seems to confer two principal advantages on the meloids possessing it. First, by attaching themselves to adult bees, meloid larvae are able to take advantage of the powers of flight of their host, which in general are considerably greater than those of adult meloids. This advantage increases a meloid species' chances of crossing a physical barrier such as an extensive water gap and of reaching a suitable habitat. Second, since many meloid larvae frequently attach themselves to individual adult bees, a bee reaching and establishing itself in a new area may introduce several meloid individuals and thus considerably enhance the prospect of the species' success, particularly since the larvae attached to a single bee will develop and emerge as adults in the same locality.

The hypothesis that phoresy is an important factor in the dispersal of the Meloidae gains support from the fact that the West Indian meloid fauna is composed of two distinct groups. These, on the basis of phylogenetic studies pursued by the senior author (Selande), seem to have developed phoresy independently. *Tetraonyx*, *Cissites*, *Pseudozonitis*, and *Nemognatha* constitute one group (the subfamily Nemognathinae) and share a number of specialized characters besides phoresy. *Meloe*, on the other hand, closely resembles the nonphoretic Meloidae (which we place with it in the subfamily Meloinae) except in those features directly connected with phoresy. Indeed, we may say that the only distinctive similarity between *Meloe* and the rest of the genera represented in the West Indies that is conceivably critical in dispersal is phoresy.

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Museum (USNM); F. G. Werner, University of Arizona; and Fernando de Zayas, Havana, Cuba. (Abbreviations in parentheses are those used in designating institutional collections in the records section of species accounts given below; the abbreviation RBS in the records section designates the collection of the senior author.)

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Finally, we take pleasure in expressing our appreciation to M. W. Sanderson, Illinois Natural History Survey, for encouraging our interest in the West Indies and for his invaluable aid in all phases of this study.

### Taxonomic Treatment

In the following accounts the synonymy listed for each species consists of a citation of the original description and of all subsequently published works that refer to the species as a part of the West Indian fauna. Diagnoses are given in place of full descriptions for certain species that have been adequately described elsewhere or that have an extensive range outside the area covered by the present study. In all other respects, we have attempted to make the accounts as complete as possible.

We have excluded from our treatment the species *Epicauta pennsylvanica* (DeGeer), a rather small, entirely black meloid ranging commonly through the greater part of the eastern two-thirds of the United States and recorded from Jamaica by Gowdey (1926, p. 13). Gowdey's record was based on two specimens collected by him in Hope Gardens, St. Andrew Parish, and now housed in the Gowdey collection at the Hope Garden Agricultural Experiment Station. Through the efforts of T. H. Farr, we were able to study one of these specimens, a typical male collected August 8, 1920. According to Farr (in litt.), the other specimen is dated October 10, 1920. In view of the information available, we concluded that Gowdey's specimens were accidentally introduced from the mainland (possibly as larvae in soil packed around roots of plants); the absence of subsequent Jamaican records indicates that the species did not succeed in establishing itself on the island.

### Key to the Species of West Indian Meloidae

1. Wingless, entirely black beetles with shortened elytra . *Meloe laevis* Leach  
Wings and elytra fully developed; color not entirely black . . . . . 2
2. Dorsal blade of tarsal claws smooth, without teeth; elytra orange, each with  
a large black basal spot and an even larger apical spot (sometimes partially  
fused), the spots covering at least two-thirds of surface . . . . . 3
- Dorsal blade of tarsal claws with a double row of small teeth ventrally; color  
pattern of elytra not as above . . . . . 5

3. Apical spot of each elytron relatively narrowly separated from basal spot, as in figure 2, or partially fused with it, well separated from sutural margin; color pattern of elytra a yellow cross on a black background (Cuba).

***Tetraonyx cruciata* Castelnau**

Apical spot of each elytron broadly separated from basal spot, attaining sutural margin or nearly so; color pattern of elytra a wide median yellow fascia on a black background . . . . . 4

4. Apical spot of each elytron exceeding middle; each elytron one-fifth as wide as long (southeastern Cuba) . . . . . ***Tetraonyx maestra*, new species**

Apical spot of each elytron not exceeding middle; each elytron one-fourth as wide as long (Hispaniola, Puerto Rico, and the Lesser Antilles).

***Tetraonyx quadrimaculata* (Fabricius)**

5. Galeae produced as slender, contiguous sucking processes that are longer than the head . . . . . 6

Galeae not extending much beyond mandibles, not longer than labial palpi, not contiguous . . . . . 7

6. Galeae and antennal segment I yellow; vertex tumid; hind tibial spurs slender, acute; elytra finely punctate . . . . ***Nemognatha punctulata* LeConte**

Galeae and antennal segment I dark; vertex not tumid; hind tibial spurs greatly thickened, spoon shaped, obtuse; elytra coarsely punctate (Cuba).

***Nemognatha occupata* (Blackwelder)**

7. Eyes small, lateral, not approaching each other beneath head; head strongly triangular; pronotum transverse; orange beetles with four black fasciae on each elytron . . . . . ***Cissites maculata* (Swederus)**

Eyes large, approximate beneath head; other characters not as above. . . 8

8. Male fore and middle tarsi swollen and expanded; male and female sixth abdominal sterna as in figures 6 and 7, respectively.

***Pseudozonitis marginata* (Fabricius)**

Male fore and middle tarsi not modified, similar in size to hind tarsi; male and female sixth abdominal sterna as in figures 9 and 10, respectively.

***Pseudozonitis obscuricornis* (Chevrolat)**

## Family Meloidae

### Subfamily Meloinae

#### Tribe Meloini

#### Genus *Meloe* Linnaeus

This interesting and distinctive genus is primarily Holarctic in distribution and is more richly developed in the Old World than in the New World. There are 19 species in the New World fauna, all limited to the North American continent. Only four of these have been recorded south of the United States, and only two (*M. laevis* Leach and *M. tropicus* Motschulsky) are known to occur as far south as Central America. West Indian fauna includes only a single species.

The principal taxonomic works on the New World species of *Meloe* are those of Champion (1891–1893) and Van Dyke (1928).

*Meloe laevis* Leach

*Meloe laevis* Leach, 1815, p. 249, pl. 8, fig. 4.—Champion, 1891–1893, p. 366.—Borchmann, 1917, p. 127.—Denier, 1935, p. 174.—Blackwelder, 1945, p. 488. *Meloe barranci*, Leng and Mutchler, 1914, p. 467 (name used in error).

DIAGNOSIS: Entirely black; surface satiny, dull. Antennae rather short, heavy, moniliform in both sexes. Head and pronotum very finely, sparsely punctate, glabrous. Elytra much shortened, divergent, impunctate, almost smooth. Hind wings absent. Abdomen impunctate, glabrous, swollen, exposed; in the female the abdomen has the aspect of an inflated, elongate bag trailing behind the anterior part of the body; in the male the abdomen is smaller, but at least a few segments are exposed behind the elytra in dorsal view; the tergites in the female are reduced to small median plate on the posterior margin of each abdominal segment. Tarsal claws with dorsal blade smooth, not dentate. Total length, 14–33 mm.; length to end of elytra, 9–15 mm.

TYPE LOCALITY: Hispaniola ("Insula America St. Domingo").

GEOGRAPHIC DISTRIBUTION: This species is common on the North American mainland, where it ranges from Colorado and Arizona in the United States south through Mexico (including the Tres Marias Islands) and Central America to Costa Rica. In the West Indies, the species has been recorded only from Hispaniola.

SEASONAL DISTRIBUTION: August 12 to September 16 on Hispaniola.

RECORDS: HISPANIOLA: Constanza, 3,000–4,000 ft., Dominican Republic, August 1938, P. J. Darlington, MCZ, one; Kenskoff, 6,000 ft., Haiti, August 12, 1924, M. Bates, MCZ, one; September 16, 1934, P. J. Darlington, MCZ, two; Mount Basil, 4,700 ft., Haiti, September 9, 1934, P. J. Darlington, MCZ, one.

REMARKS: The Hispaniolan specimens are all females. We have compared them with specimens from a number of localities in Mexico and have been unable to find significant differences. The type of the species is in the British Museum (Natural History).

HABITS: Unknown.

## Subfamily Nemognathinae

## Tribe Tetraonycini

Genus *Tetraonyx* Latreille

Restricted to the New World and primarily tropical in distribution, *Tetraonyx* is represented in South America (primarily Brazil) by 77 currently recognized species, in Mexico and Central America by 14, in the United States and Canada by 4, and in the West Indies by 3.

Haag-Rutenberg's (1879) monograph is the standard reference for the genus, but it should be noted that a number of species and varieties have been described since its publication.

*Tetraonyx quadrimaculata* (Fabricius)

FIGURE 1

*Apalus 4 maculatus* Fabricius, 1792, p. 50.

*Mylabris ruficollis* Olivier, 1795, pp. 14-19, pl. 2, fig. 17.

*Tetraonyx 4-maculatus*, Haag-Rutenberg, 1879, p. 308.—Leng and Mutchler, 1917, p. 216.

*Tetraonyx quadrimaculatus*, Chevrolat, 1877, p. ix.—Fleutiaux and Sallé, 1889, p. 433.—Gundlach, 1894, p. 318 (in part).—Champion, 1896, p. 53.—Borchmann, 1917, p. 113 (in part).—Wolcott, 1924, p. 85; 1936, p. 209.—Denier, 1935, p. 168 (in part).

*Nemognatha cubaecola*, Gundlach, 1891, p. 258 (in part).

*Tetraonyx quadrimaculata*, Leng and Mutchler, 1914, p. 467 (in part).—Blackwelder, 1945, p. 487 (in part).—Wolcott, 1950, p. 321 (in part).

*Tetraonyx quadrimaculatus* var. *bimaculatus*, Staig, 1940, p. 142, pl. 57.

DESCRIPTION: Head, antennae, labrum, and mandibles black; maxillae and labium yellow except last segment of palpi infuscate. Pronotum and scutellum orange-yellow. Elytra orange-yellow, each with a black spot covering most of basal fourth and another covering most of apical two-fifths; hind margin of basal spot nearly straight; basal spot separated from sutural margin of elytron by a distance equal to or slightly greater than half the width of the scutellum at its apex and from lateral margin by about twice this distance; apical spot attaining lateral margin and apex of elytron, in most cases also attaining sutural margin but occasionally very narrowly separated, especially anteriorly. Wings pallid brown with dark apex. Under surface orange-yellow, except mesothorax and metathorax (or at least the pleurites), largely black, and the last one or two abdominal sterna of the same color. Femora orange-yellow except apices broadly black; tibiae and tarsi black. Pubescence dense, recumbent throughout, of the same color as surface except always yellow on under surface of thorax. Length, 6-12 mm.

Head subtriangular or triangular; occiput nearly straight; surface even on vertex, a little roughened on front, coarsely, densely punctate, dull; a fine smooth median line usually indicated from occiput to center of front. Eyes large, weakly emarginate. Antennae reaching (over vertex) base of pronotum, compressed-moniliform; segment I reaching about one-third distance across eye; II less than half and III fully half as long as I; III to V progressively wider and less compressed; VI to X similar to V, about one-third longer than wide. Pronotum transverse, one-half to nearly three-fourths wider than long, obviously wider than head; base sinuate medianly; hind angles distinct but not sharp; front angles well rounded; disk convex,

impressed along base; surface as on vertex. Elytra finely scabropunctate, dull. Both hind tibial spurs thickened, spatulate, the outer one usually wider.

Male having fore tarsi with first to fourth segments greatly expanded; first segment strongly asymmetrical, third only slightly so. Fifth abdominal sternum deeply, broadly emarginate. Sixth sternum moderately deeply, triangularly emarginate, impressed. Genitalia with gonostyli gradually divergent, slender, compressed, notched ventrally near apex; aedeagus slender, needlelike apically, lacking ventral hooks; dorsal hook small.

Female having fore tarsi only moderately expanded; segments symmetrical. Fifth abdominal sternum entire or nearly so. Sixth sternum truncate or very shallowly emarginate medianly.

TYPE LOCALITY: Of *T. quadrimaculata*, North America. Of *ruficollis*, given as "Siberia," obviously in error.

GEOGRAPHIC DISTRIBUTION: Trinidad, the Lesser Antilles, Puerto Rico, Hispaniola, and the Coastal Plain and Piedmont of the southeastern United States from North Carolina to southwestern Alabama (Mobile County) and northern Florida (Alachua and Putnam Counties).

SEASONAL DISTRIBUTION: Adults have been collected in the West Indies in every month of the year except November. In the United States they are recorded from July 21 to October.

RECORDS: GRENADA: Mount Gay Estate, leeward side, H. H. Smith, BM, one. GUADELOUPE: August 1956, R. Bénard, INRA, one; Camp-Jacob, 500-600 m., March (Fleutiaux and Sallé, 1889). HISPANIOLA: Puerto Plata, Dominican Republic, August 29 to September 2, 1938, P. J. Darlington, MCZ, one; Villa Altagracia, Dominican Republic, July 1938, P. J. Darlington, MCZ, one. MONTSERRAT: March 23, H. G. Hubbard, USNM, two; 1894, H. G. Hubbard, USNM, one; H. A. Ballou (donor), USNM, one. PUERTO RICO: Country label only, RBS, one; Arroyo, February 1899, A. Busck, USNM, one; Bayamón, April 9, 1934, USNM, seven; Guajataca, December 28, 1943, Rosamo, UPR, one; Haltillo, March 21, 1937, J. Bruast, UPR, one; Indiera Alta, Maricao, June 5, 1944, J. A. Ramos, UPR, four; Isabela, January 1940, J. Usera, UPR, one; Jayuya, December 1932, C. Gonzales, MCZ, one; mountains east of Maricao, July 28, 1943, J. A. Ramos UPR, one; Trujillo Alto (Wolcott, 1950); Vega Alta, May 23, 1933, Mills and Anderson, USNM, two; Villalba, October 15, 1930, C. G. Salazar, UPR, one; Yauco-Lares Road, Kilometer 22, July 25, 1953, J. A. Ramos, UPR, three. ST. THOMAS (Haag-Rutenberg, 1879). ST. VINCENT: South end, H. H. Smith, BM, one; windward side, 1896-1898, H. H. Smith, USNM, one.

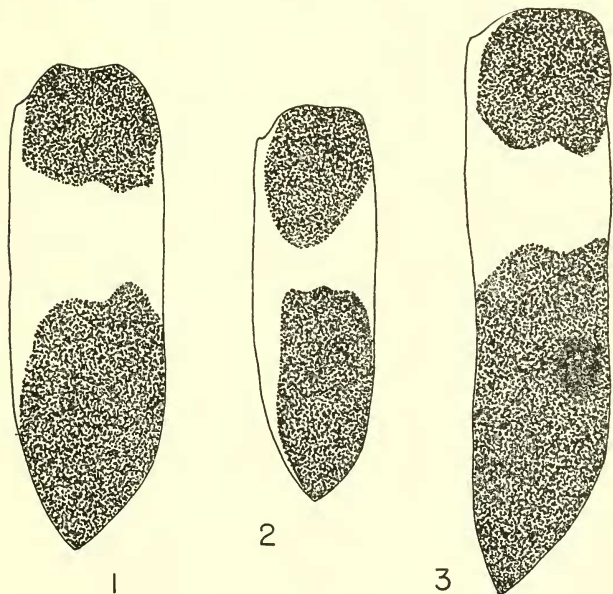


REMARKS: The description given above applies to the West Indian material listed as well as to six specimens from the United States and two from the island of Trinidad (Fry collection, British Museum). Besides the original description, references to *T. quadrimaculata* in the United States include LeConte's (1853) redescription and the records of Blatchley, Brimley, and Löding cited below under "habits."

There is noticeable variation in *T. quadrimaculata* in several characters, but apparently only the shape of the male sixth abdominal sternum varies geographically.

Variation in color is limited largely to the relatively minor point of whether the apical black spots of elytra actually attain the sutural margins and to the extent of black markings on the under surface of the body. One of the males from the United States is exceptional in that only the sixth abdominal sternum (rather than the fifth and sixth sterna) is black. This specimen also has the black thoracic marking reduced to a suffusion partially covering the pleurites on each side.

Variation in size (as expressed by the length of the elytra) and in the proportions of the pronotum and elytra is indicated in tables 2



FIGURES 1-3.—1, *Tetraonyx quadrimaculata*, right elytron (Montserrat); 2, *T. cruciata*, same; 3, *T. maestra*, same (holotype).

TABLE 2.—*Length of elytra (in millimeters) for four species of Tetraonyx.*

Species	Males		Females	
	Mean and Range	Number	Mean and Range	Number
<i>T. quadrimaculata:</i>				
United States	8.10 (7.2-9.4)	4	8.75 (8.5-9.0)	2
Hispaniola-Puerto Rico	7.85 (6.9-10.0)	13	8.77 (5.6-10.7)	12
Lesser Antilles	9.40 (7.2-10.6)	4	9.55 (8.3-10.8)	2
<i>T. cruciata:</i> Cuba	6.40 (5.1-7.6)	8	6.74 (6.2-8.0)	6
<i>T. maestra:</i> Cuba			11.68 (11.1-12.2)	2
<i>T. bimaculata:</i> Brazil	7.8	1		

and 3. It will be noted that the average size of the females is slightly greater than that of the males.

The sixth abdominal sternum in males from the United States has relatively deep, regularly triangular, straight-sided emargination and rather evenly tapered lateral lobes. On Hispaniola and Montserrat the emargination is similar in form to the above but slightly shallower, and the lateral lobes are more noticeably rounded on the lateral margin. Males from Puerto Rico and St. Vincent differ from the rest in that the angle of the emargination is much more obtuse, with the sides of emargination definitely sinuate.

The species *Tetraonyx quadrimaculata* is a member of a closely knit and poorly understood complex that includes the Cuban forms *T. cruciata* and *T. maestra*, the Brazilian *T. bimaculata* Klug, and in all probability *T. maculata* Haag-Rutenberg. We have not seen specimens of the last form, which is recorded from southern Mexico and Central and South America, but from its description we concluded that it is intimately related to *T. quadrimaculata*. *T. cruciata* and *T. bimaculata* have long been regarded as varieties of *T. quadrimaculata*. However, we prefer to regard them as separate species for the present,

TABLE 3.—*Proportions of pronotum and right elytron (in percent) for four species of Tetraonyx.*

Species	Pronotum (length/width)		Elytron (width/length)*	
	Mean and Range	Number	Mean and Range	Number
<i>T. quadrimaculata:</i>				
United States	68.18 (66.7-70.8)	5	23.82 (22.8-25.0)	6
Hispaniola-Puerto Rico	66.61 (52.1-72.4)	25	24.72 (22.5-28.0)	25
Lesser Antilles-Trinidad	68.96 (61.7-69.0)	8	25.15 (23.2-26.9)	6
<i>T. cruciata:</i> Cuba	69.32 (61.0-75.3)	14	24.50 (21.0-26.0)	14
<i>T. maestra:</i> Cuba	74.25 (71.1-77.4)	2	20.60 (20.1-21.2)	2
<i>T. bimaculata:</i> Brazil	59.7	1	25.2	1

\* Width measured at narrowest point between base and middle of elytron.

and interpret the complex to which they belong as a superspecies rather than a polytypic species.

On the basis of a single male that we examined from Nova Teutonia, Brazil, and Haag-Rutenberg's (1879) description, we concluded that *T. bimaculata* differs from *T. quadrimaculata* as follows: Color a deeper yellow; surface shinier, with the head and pronotum more finely and sparsely punctate; occiput distinctly convex on each side of the mid-line; front angles of pronotum well defined, not rounded; under surface of abdomen entirely black; male fore tarsi less strongly expanded, the first segment relatively weakly produced on anterior side. The sixth sternum is most similar to that of *T. quadrimaculata* from Hispaniola and Montserrat.

*T. cruciata* differs constantly from *T. quadrimaculata* only in the characters of elytral color pattern. In average size it is significantly smaller (table 2), but there is appreciable overlap. The male sixth sternum is most similar to that of *T. quadrimaculata* from Puerto Rico and St. Vincent. All the specimens of *T. cruciata* we have recorded are from central Cuba.

Judged from the two specimens studied, *T. maestra*, which presumably replaces *T. cruciata* in the mountains of Oriente Province of Cuba, is distinctly the largest representative of the *T. quadrimaculata* complex (table 2). Its elytral color pattern is unique. In addition, indications are that on the average the pronotum is more quadrate in form and the elytra more elongate than in the other species of the complex (table 3).

According to our view, *T. cruciata* and *T. maestra* represent lines of *T. quadrimaculata* that reached Cuba independently, probably at different times. Possibly the two forms subsequently differentiated in geographic isolation from each other, but it seems much more likely, in view of the marked displacement of their characters relative to those of *T. quadrimaculata*, that there was established at some time in their history a sympatric relationship leading to an accentuation of morphological (and probably ecological) differences between them. For a recent discussion of the evolutionary processes that might operate in such a situation, see Brown and Wilson (1956).

HABITS: Wolcott's latest report (1950, p. 321) on the insects of Puerto Rico contains the following information regarding the habits of *T. quadrimaculata*:

The beetles are possibly most often found on the flowers of leguminous plants in the more humid parts of the Island, but may occur on other kinds of flowers, as on flowers of "yerba bellaca" (*Croton humilis* [Euphorbiaceae]) at Isabela, of *Lantana camara* [Verbenaceae] at Trujillo Alto, and sometimes in such abundance as to cause appreciable injury, as on grapefruit [*Citrus paradisi* (Rutaceae)] blossoms at Bayamón, and on flowers of tecoma vine or "ricosolana" (*Pandorea ricasoliana* [Bignoniaceae]) at Isabela.

Earlier Wolcott (1924) recorded this species from *Aeschynomene americana* (Leguminosae) at Arecibo, Puerto Rico. The two specimens that we have studied from Vega Alta, Puerto Rico, are from *Lantana*.

In Guadeloupe Fleutiaux and Sallé (1889) recorded the species from *Duranta plumieri* (Verbenaceae). In the United States it has been recorded by Blatchley (1923) and Löding (1945) from *Bradburya* (= *Centrosema*) *virginiana* (Leguminosae) and by Brimley (1938) from butterfly pea (probably *Clitoria*, Leguminosae) and wild sweet-potato (*Ipomoea*, Convolvulaceae).

***Tetraonyx cruciata* Castelnau**

FIGURE 2

*Tetraonyx cruciatus* Castelnau, 1840, p. 277.—Haag-Rutenberg, 1879, p. 308. Leng and Mutchler, 1914, p. 467.

*Nemognatha cubaecola* Jacquelin-Duval, 1856, p. 68, pl. 8, fig. 18.—Gundlach, 1891, p. 258 (in part).

*Tetraonyx* (sic) *cubensis* Chevrolat, 1858, p. 210.

*Tetraonyx quadrimaculatus*, Chevrolat, 1877, p. ix (in part).—Gundlach, 1894, p. 318 (in part).—Borchmann, 1917, p. 113 (in part).

*Nemalognatha cubaecola*, Leng and Mutchler, 1914, p. 467.

*Tetraonyx cubensis*, Leng and Mutchler, 1914, p. 467.

*Tetraonyx quadrimaculata*, Leng and Mutchler, 1914, p. 467 (in part).—Wolcott, 1950, p. 321 (in part).

*Tetraonyx quadrimaculatus* var. *cruciatus*, Denier, 1935, p. 168.

*Tetraonyx quadrimaculatus* var. *cubaecola*, Denier, 1935, p. 168.

*Tetraonyx quadrimaculata* var. *cruciata*, Blackwelder, 1945, p. 487.

*Tetraonyx quadrimaculata* var. *cubaecola*, Blackwelder, 1945, p. 487.

DIAGNOSIS: Similar to *T. quadrimaculata* except as follows: Basal spot of each elytron longitudinally oval, attaining at least basal third of elytron; apical spot attaining middle of elytron, relatively narrowly separated from basal spot, with a tendency to fuse with it, separated at its anterior end from sutural margin by about same distance as from basal spot, this distance decreasing evenly to near apex of elytron. The color pattern produced is that of a rather fine, regular yellow cross on a black background. Average size of beetles smaller (table 2); total length, 7–9 mm. (see also table 3).

TYPE LOCALITY: Given in the original description of *T. cruciata* as "Saint-Dominque," presumably in reference to the Hispaniolan region now known as the Dominican Republic. We believe, however, that the locality is erroneous; the species has otherwise not been recorded outside Cuba. Of *N. cubaecola* and *T. cubensis*, Cuba.

GEOGRAPHIC DISTRIBUTION: Cuba (Havana and Las Villas Provinces).

SEASONAL DISTRIBUTION: July to November 8.

RECORDS: CUBA: Country label only, BM, one; Havana, C. E. Baker, USNM, one; T. Barbour, USNM, one; San Blas, 2,000 ft.,

Santa Clara (=Las Villas) Province, September 21, 1932, B.B. Leavitt, MCZ, two; Santiago de las Vegas, October 23, 1930, USNM, three; July 1951, F. de Zayas, RBS, one; Soledad, Cienfuegos, October 22-26 and November 8, 1926, P. J. Darlington, MCZ, six.

REMARKS: See remarks for *T. quadrimaculata*.

HABITS: Adults have been reported by Gundlach (1891) from *Duranta plumieri* (Verbenaceae), which is one of the food plants recorded for *T. quadrimaculata*.

#### *Tetraonyx maestra*, new species

##### FIGURE 3

DIAGNOSIS: Similar to *T. quadrimaculata* except as follows: Apical spot of each elytron exceeding middle of elytron (but still well separated from basal spot), attaining sutural margin throughout, truncate anteriorly. Pronotum and elytra, on the average, more elongate (table 3). Average size of beetles larger (table 2); total length 12.5-14 mm.

GEOGRAPHIC DISTRIBUTION: Oriente Province, Cuba.

TYPE MATERIAL: Holotype female from Pico Turquino, south side, 3,000-5,000 ft., June 1936, P. J. Darlington, in MCZ. Paratype female from Loma del Gato, Oriente Province, July 1953, F. de Zayas and Alayo.

REMARKS: See remarks for *T. quadrimaculata*.

HABITS: Unknown.

### Tribe Horiini

#### Genus *Cissites* Latreille

This genus, with two species, is the Neotropical representative of the tribe Horiini, which in the Oriental and Ethiopian regions includes the genera *Horia* and *Synhoria*. In the larval stage the species of Horiini are nest parasites of carpenter bees (*Xylocopa*).

The presence of *Cissites maculata* (Swederus) in the West Indian fauna is well established, and this species is treated below. On the other hand, the reported occurrence of *C. auriculata* (Champion) in the West Indies is questionable. According to Champion (1891-1893), Guilding's record (1827) of a variety of *C. maculata* from Barbados having the "*porca* in duos processus auriformes irregulares expanditur" is probably referable to *C. auriculata*. This opinion was subsequently accepted by Leng and Mutchler (1917) in their list. However, the possibility that Guilding actually was dealing with a variant of *C. maculata* cannot be so easily discounted, nor can the possibility that a third species is involved be entirely dismissed. It therefore seems preferable to reserve assignment of Guilding's Barbados record pending further information (see footnote 2, p. 213).

*Cissites maculata* (Swederus)

*Cucujus maculatus* Swederus, 1787, p. 199, pl. 8, fig. 8.

*Horia maculata*, Olivier, 1792, p. 102; 1795, No. 53 bis, p. 4, pl. 1, fig. A, 1.—Latreille, 1807, p. 211.—Castelnau, 1840, p. 279.—Fleutiaux and Sallé, 1889, p. 433.—Champion, 1891–1893, p. 371; 1896, p. 52.—Leng and Mutchler, 1914, p. 467; 1917, p. 216.—Denier, 1935, p. 151.

*Cissites maculata*, Gahan, 1908, p. 203.—Borchmann, 1917, p. 175.—Cros, 1928, pp. 108, 114.—Blackwelder, 1945, p. 482.—Wolcott, 1950, p. 321.—Enns, 1958, p. 63.

*Horia auriculata* Duges (sic), Wolcott, 1924, p. 85; 1936, p. 209. Misidentification.

DIAGNOSIS: Orange. Antennae, mandibles, palpi, femoral apices, tibiae, and tarsi black. Each elytron with a heavy basal and apical black fascia and with two black fasciae between, the latter usually interrupted or constricted at middle, each formed by approximation or fusion of two spots. Upper surface shiny, subglabrous. Head and pronotum finely, densely punctate, smooth. Head unusually large, strongly triangular; tempora in male larger than in female but not so greatly swollen as to form a deep median groove on vertex and not excavate behind. Pronotum only weakly convex, strongly transverse, wider apically than basally. Antennae short; segments elongate-moniliform. Tarsi compressed. Tarsal claws with dorsal blade heavy, strongly curved, with a short double row of teeth ventrally at middle; ventral blade slender. Length, 18–25 mm.

TYPE LOCALITY: Unknown. Given as "New York Americae" in the original description, but this designation is probably incorrect.

GEOGRAPHIC DISTRIBUTION: Southern Mexico (Morelia, Michoacán), Central America, Tropical South America (including the Galápagos Islands and Trinidad), and the West Indies. In the West Indies the range extends along the arc of the Lesser Antilles to Puerto Rico, Hispaniola, and Cuba.

SEASONAL DISTRIBUTION: Records exist of adults collected in the West Indies in February, March, July, September, and November and thus seem to indicate that the species reproduces more or less continuously throughout the year.

RECORDS: CUBA: De Zayas, (in litt.). DOMINICA (Leng and Mutchler, 1917). GUADELOUPE: July 1957, INRA, one; Pointe-à-Pitre (Fleutiaux and Sallé, 1889); Trois-Rivières (Fleutiaux and Sallé, 1889). HISPANIOLA: Port-au-Prince, Haiti, March 21–29, 1922, about 300 ft. alt. (Enns, 1958); "St. Dom.," BM, one. PUERTO RICO: Camuy, November 1947, A. R. Rivera, UPR, one; Hormigueros (Wolcott, 1950); Mayagüez, February 8, 1944, J. A. Ramos, UPR, one; March 1934, J. R. Iñigo, MCZ, one; May 20, 1949, UPR, one; July 1–31, 1953, J. A. Ramos, UPR, three; Río Piedras, September 8, 1931, Alsina, MCZ, one; San Germán, February 12, 1935, S.



Vazquez, UPR, one. ST. VINCENT: Southern end of island, May, H. H. Smith, BM, one.

REMARKS: We have been unable to find significant differences between series of specimens from different islands in the West Indies or between the West Indian material and specimens from Brazil and Trinidad. Varieties in which the median two fasciae of each elytron are absent or in which the elytra are entirely black have been described from South America.

In Blackwelder's catalogue (1945) the reference to Puerto Rico in the list of localities for *C. auriculata* should be transferred to the list for *C. maculata*, as this reference is based on Wolcott's misidentification (1924, 1936) of the latter species.

Swederus (1787) described *C. maculata* from an unspecified number of specimens in the collection of "D. Davies." The present location of this material is not known to us.

HABITS: The literature on the parasitic association of *Cissites maculata* and various species of *Xylocopa* bees was briefly reviewed recently by Hurd (1958). Unfortunately, this review failed to mention the only definite association in the West Indies, that recorded by Fleutiaux and Sallé (1889), who noted that at Trois-Rivières, Guadeloupe, beetles had been observed coming out of the nest, located in the rafters of a stable, of a bee identified by them as *X. aeneipennis* DeGeer.<sup>2</sup> These authors also reported specimens collected at light on the same island. The specimen of *C. maculata* that we have studied from St. Vincent (previously reported by Champion, 1896) bears the notation that it was found dead under a rotten log.

The habits of the adult beetles have not been described. It is known, however, that in a related species, *Synhoria testacea* (Fabricius), the female oviposits in the burrow of the host bee, and it may well be that *Cissites* exhibits this same behavioral degeneracy. In this connection the absence of records of plant associations for adult *Cissites* beetles seems significant, for it has been established in the nemognathine genera *Tricrania* and *Hornia* that evolutionary elimination of the habit of ovipositing on the food plants of host bees is accompanied by loss of feeding activity on the part of the adult beetles.

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\* The biological observations on *C. maculata* and *X. teredo* Guilding reported by Guilding in 1825 may have been made in the West Indies, as Hurd (1958) assumed, inasmuch as Guilding was living on the island of St. Vincent at the time that his article appeared. However, in this article Guilding did not give a locality for his observations, while in a supplementary note published 2 years later, Guilding (1827) implied that his observations were made in South America. Brues' citation (1924) of Barbados as the locality in question can be discounted; it was based on his failure to distinguish between the two articles of Guilding. Similarly, MacSwain's opinion, as expressed by Hurd (1958), that "the meloid identified by Guilding as *Horia maculata* is probably *Cissites auriculata*" certainly refers to Guilding's 1827 Barbados record and not, as implied by Hurd, to the insect treated by Guilding in 1825.

## Tribe Nemognathini

Genus *Pseudozonitis* Dillon

The name *Pseudozonitis* is applied to the New World species of a group whose Old World representatives are currently divided among the genera *Zonitoschema*, *Zonitodema*, and *Zonitopsis*. With the assignment of the two West Indian species treated below the total species of *Pseudozonitis* has been brought to 20. The North and Central American species were revised recently by Enns (1956). The only South American member of the genus that we know of is an apparently undescribed species from Argentina.

*Pseudozonitis marginata* (Fabricius), new combination

## FIGURES 4-7

*Lagria marginata* Fabricius, 1781, p. 159; 1787, p. 93.

*Dryops marginata*, Fabricius, 1792, pt. 2, p. 76; 1801, p. 68.

*Oedemera marginata*, Olivier, 1795, No. 50, p. 8, pl. 1, fig. 7.

*Epicauta annulicornis* Chevrolat, 1877, p. ix.—Gundlach, 1894, p. 319.—Leng and Mutchler, 1917, p. 216.—Borchmann, 1917, p. 70.—Denier, 1935, p. 152.—Blackwelder, 1945, p. 482.—Wolcott, 1924, p. 84; 1936, p. 208; 1950, p. 321. New synonymy.

*Lytta delauneyi* Fleutiaux and Sallé, 1889, p. 433.—Borchmann, 1917, p. 93.

*Zonitis lineata* Champion, 1896, p. 53.—Leng and Mutchler, 1914, p. 467.—Staig, 1940, p. 147, pl. 58.

*Zonitis strigata* Wellman, 1910, p. 26.—Borchmann, 1917, p. 164.—Denier, 1935, p. 149.—Blackwelder, 1945, p. 481. New name for *Zonitis lineata* Champion, not Melsheimer, 1846, p. 53. New synonymy.

*Cantharis annulicornis*, Leng and Mutchler, 1914, p. 467.

*Cantharis delauneyi*, Leng and Mutchler, 1914, p. 467.

*Zonitis* sp., Wolcott, 1924, p. 85 (record No. 613-13); 1936, p. 209.

*Zonitis guanicana* Wolcott, 1950, p. 321. New synonymy.

*Zonitis annulicornis*, Vaurie, 1950, p. 11.

DESCRIPTION: Light tawny orange-yellow. Apical half of mandibles black. Antennae, last two segments and apical half of first segment of maxillary palpi, last segment of labial palpi, femoral apices, tibiae (except immediate base), and tarsi fuscous. Antennae conspicuously annulate with orange-yellow at articulations of segments; tarsi not or only vaguely so. Elytra each with a rather broad, fuscous submarginal vitta and a similar subsutural one that are united at base and apex, leaving a narrow orange-yellow discal line, or with vittae broken medianly, or with vittae reduced to a fuscous basal mark and a subapical spot, or with no fuscous markings whatsoever. Wings nearly colorless. Pubescence moderately dense, short, pale. Length, 11-15 mm.

Head shape nearly as in *P. arizonica* (Van Dyke), subtriangular; width at tempora barely less than distance from top of vertex to base of labrum; vertex weakly tumid, flattened at center; surface moderately coarsely, densely punctate except for an ill-defined impunctate area between eyes, extending laterally on each side to antennal base and along midline to center of vertex. Eyes extremely large, separated on front by a distance varying from  $\frac{3}{10}$  to  $\frac{2}{5}$  width of head at tempora, separated beneath head by  $\frac{1}{4}$  to nearly  $\frac{1}{2}$  distance on front. Mandibles relatively short, strongly bent. Galeae lobiform, shorter than labial palpi. Antennae  $4\frac{1}{2}$  to  $4\frac{3}{4}$  as long as pronotum, very slender, setaceous; segment I definitely short of middle of eye; III as long as I; II shorter; IV about  $\frac{1}{2}$  longer than III; V to X subequal, as long or slightly longer than IV; XI  $\frac{1}{2}$  longer than II. Pronotum barely wider than long, quadrate campanuliform; sides subparallel for basal  $\frac{2}{3}$ ; disk impressed on each side before middle; surface moderately coarsely, densely punctate. Scutellum large, obtuse. Elytra densely rugose punctate, as in *P. pallida* Dillon and *P. megalops* (Champion). Hind tibial spurs enlarged, concave behind, subequal.

Male having fore and middle tarsi distinctly swollen and expanded; hind tarsi just perceptibly so. Fifth abdominal sternum moderately deeply emarginate medianly, with a triangular impressed, glabrous area medianly. Sixth sternum cleft, strongly impressed; each half of sternum medianly emarginate apically, strongly recurved at base, and with a small process on median margin near middle. Male

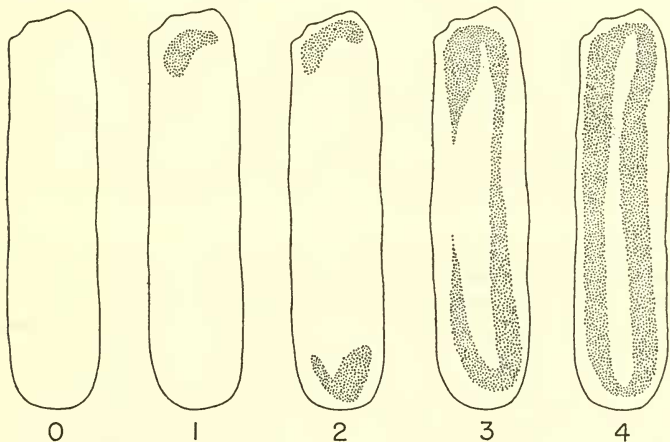


FIGURE 4.—*Pseudozonitis marginata*, variation in elytral color pattern. Numerals designate color classes (see text and table 4, p. 217).

genitalia as in figure 5; fused gonocoxites strongly tapered to a narrow apex.

Female having fifth abdominal sternum with surface entire or nearly so. Sixth sternum with a shallow V-shaped emargination medianly; lateral lobes of sternum broadly rounded. Pygidium weakly notched medianly.

TYPE LOCALITY: *P. marginata*, South America. Of *E. annulicornis*, Puerto Rico. Of *C. delauneyi*, Camp-Jacob, Guadaloupe. Of *Z. strigata* (= *C. lineata*), Balthazar, Grenada. Of *Z. guanicana*, Guanica, Puerto Rico.

GEOGRAPHIC DISTRIBUTION: Widespread in and apparently confined to the West Indies.

SEASONAL DISTRIBUTION: February 29 (1940) to July 6.

RECORDS: BAHAMA ISLANDS: Fresh Creek, Andros Island, April 23, 1953, E. B. Hayden and L. Giovannoli, AMNH, two. CUBA: Sierra de Cubitas, Paredona Cang., June 1955, F. de Zayas, RBS, one. DOMINICA: June-July 1913, H. W. Foote, USNM, one; A. H. Verrill, USNM, one. GRENADA: Balthazar, H. H. Smith, BM, two. GUADELOUPE: June 1956, R. Bénard, INRA, one; Camp-Jacob, May (Fleutiaux and Sallé, 1889). HISPANIOLA: Dominican Republic (Vaurie, 1950); Port-au-Prince, Haiti, April 1925, G. N. Wolcott, USNM, one. JAMAICA: Mandeville, May 1958, F. S. Coon, IJ, one. PUERTO RICO: Aguas Buenas, April 8, 1944, R. Zayas, UPR, one; Guánica (Wolcott, 1950); Guánica Insular Forest, July 6, 1953, J. A. Ramos and J. Maldonado, UPR, one; Mayagüez, June 11, 1914, R. H. Van Zwalenburg, USNM, one; May 1938, R. del Moral, UPR, one; May 12, 1939, J. A. Ramos, UPR, one; February 29, 1940, W. E. Lang, UPR, one; May 1940, J. Vicéns, UPR, one; April 25, 1942, J. Hernandez, UPR, one; June 20, 1957, J. A. Ramos, UPR, one; San Sebastian, July 1938, J. Araujo, UPR, one; April 7, 1939, M. Aviles, UPR, one. ST. CROIX: 1937, 1941, and May 1, 1941, H. A. Beatty, USNM, three; Canaan, not located, 1951, G. A. Seaman, USNM, six. ST. LUCIA: March 27 and April 21, 1936, R. E. Blackwelder, USNM, three.

REMARKS: The expanded male fore and middle tarsi, the somewhat elaborate modification of the male sixth abdominal sternum, and the form of the male genitalia readily separate *P. marginata* from all other known species of the genus *Pseudozonitis*; on the basis of these characters, a separate species group should be established for it. With respect to the male genitalia, *P. marginata* most closely resembles a male *Pseudozonitis* collected by one of us (Selander) in Oaxaca in 1955 and tentatively identified by us as *P. megalops* (Champion), a Central American form originally described from Guatemala. Except for the absence of the unusual sexual modifications noted

above, this specimen is quite similar to *P. marginata* in structural characters and agrees in color with immaculate specimens of the latter. We are therefore convinced that a closer relationship exists between *P. marginata* and *P. megalops* than between *P. marginata* and any other species of the genus.

The extensive synonymy of *P. marginata* is largely attributable to the fact that the elytra vary from a distinctly striped condition to an immaculate one. While this variation is essentially continuous, as a matter of convenience we have recognized five color classes. These are shown in figure 4, and their frequency distribution in the various samples is given in table 4. The absence of class 0 at localities between the Bahamas and Grenada is perhaps noteworthy. However, an analysis of the data now available indicates that the level of significance of the variation is slightly above the one percent level.

The ratio of the distance separating the eyes on the front of the head to the distance separating them beneath is unusually variable, without evident geographic or sexual correlation. The shape of the pronotum varies slightly, again on an individual basis.

We were unable to locate the types of *E. annulicornis* and *L. delauneyi*. The type of *P. marginata* is in the Hunterian Collection at Glasgow University, and the type of *Z. strigata* (= *Z. lineata*) is in the British Museum (Natural History). The type of *Z. guanicana* is neither in the collections in Puerto Rico nor in the U.S. National Museum; presumably it was destroyed. The male paratype of *Z. strigata* (= *Z. lineata*) that we examined was compared with the type of *P. marginata* by K. G. Blair.

TABLE 4.—Frequency distribution of color classes in samples of *Pseudozonitis marginata*.

Localities	Color classes					Number of specimens
	0	1	2	3	4	
Bahamas	2					2
Cuba			1			1
Jamaica			1			1
Hispaniola			1			1
Puerto Rico			a 7	2	b 4	13
St. Croix				6	3	9
Guadeloupe			c 1		1	2
Dominica					2	2
St. Lucia		1			2	3
Grenada	2		1	1	1	d 5

a Type of *Z. guanicana* (not examined) included.

b Type of *E. annulicornis* (not examined) included.

c Type of *L. delauneyi* (not examined).

d Type series of *Z. strigata* (specimens in classes 2, 3, and 4 not examined); specimen in class 3 questionably assigned from Champion's description and not included in analysis of variance.

HABITS: Several specimens are labeled as taken at light. It is interesting that of the total of 33 specimens examined, only 4 are males.

*Pseudozonitis obscuricornis* (Chevrolat), new combination

FIGURES 8-11

*Epicauta obscuricornis* Chevrolat, 1877, p. x.—Gundlach, 1894, p. 319. Borchmann, 1917, p. 79.—Wolcott, 1924, p. 84.—Denier, 1935, p. 158.—Wolcott, 1936, p. 208.—Blackwelder, 1945, p. 483.—Wolcott, 1950, p. 321.

*Cantharis obscuricornis*, Leng and Mutchler, 1917, p. 467.

*Zonitis* sp., Wolcott, 1924, p. 85 (record 590-13); 1936, p. 208.—Blackwelder, 1945, p. 482.

*Zonitis smythi* Wolcott, 1950, p. 321. New synonymy.

DIAGNOSIS: Similar to *P. marginata* except as follows: Pronotum frequently with a wide median rufous vitta. Elytra each with a rather broad, fuscous submarginal vitta and a similar subsutural one, these united at base and apex and leaving a narrow orange-yellow discal line, or with vittae narrowed and pale fuscous in color, or with vittae entirely absent. Middle of femora and tibial apices sometimes weakly infusate. Length, 9-12 mm.

Distance separating eyes beneath head varying from one-fifth to two-fifths distance on front. Antennae even more slender than in *P. marginata*; segments I to III subequal in length. Pronotum as long as or barely longer than wide.

Male having fore and middle tarsi neither swollen nor expanded, similar in size to hind tarsi. Sixth abdominal sternum cleft, moderately impressed, each side evenly tapered, not emarginate, not recurved at base. Genitalia as in figure 8; fused gonocoxites broad, sinuate, abruptly curved dorsad at apex.

Female having sixth abdominal sternum with an extremely deep, oval emargination medianly.

TYPE LOCALITY: Of *P. obscuricornis*, Puerto Rico. Of *Z. smythi*, Guánica, Puerto Rico.

GEOGRAPHIC DISTRIBUTION: Apparently confined to the West Indies. Recorded from Jamaica, Puerto Rico, and Guadeloupe.

SEASONAL DISTRIBUTION: April to November 6.

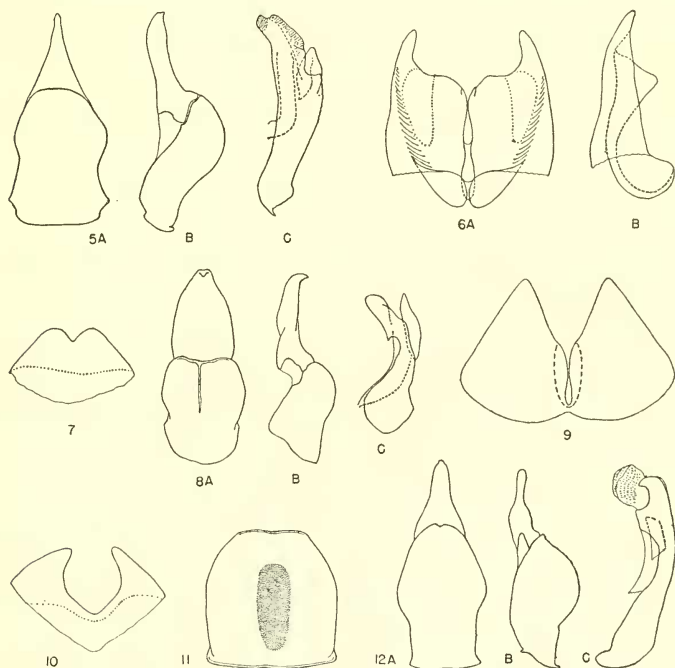
RECORDS: JAMAICA: St. Andrew, Molynes Road, May 15, 1949, A. W. Wiles, IJ, three. GUADELOUPE: April 1957, R. Bénard, INRA, two. PUERTO RICO: Guánica, July 30, 1913, E. G. Smyth, USNM, one; Guánica Insular (or State) Forest, November 6, 1953, J. Maldonado, UPR, three; June 30, 1955, J. A. Ramos and J. Maldonado, UPR, five.

REMARKS: This species falls within the *Longicornis* group defined by Enns (1956). The three other species included in this group are presently recorded only from the southwestern United States.



The elytral vittae are narrowed in one of the specimens from Puerto Rico and in all three from Jamaica. In both specimens from Guadeloupe, the elytral vittae are entirely absent. The Jamaican specimens lack the rufous vitta of the pronotum.

We have examined five males, two each from Puerto Rico and Jamaica, and one from Guadeloupe. In the form of the genitalia, the male from Guadeloupe differs slightly from the males from Puerto Rico, whose genitalia are identical. One of the males from Jamaica has genitalia of the Puerto Rican type, while the other more nearly approaches the Guadeloupe specimen in this respect.



FIGS. 5-12.—*Pseudozonitis marginata* (Puerto Rico): 5, dorsal (A) and lateral (B) views of male gonoforceps, and (C) lateral view of aedeagus; 6, ventral (A) and lateral (B) views of male sixth abdominal sternum; 7, ventral view of female sixth sternum. *Pseudozonitis obscuricornis*: 8, dorsal (A) and lateral (B) views of male gonoforceps, and (C) lateral view of aedeagus (Jamaica); 9, ventral view of male sixth abdominal sternum (Puerto Rico); 10, ventral view of female sixth sternum (Jamaica); 11, pronotum (Jamaica). *Nemognatha occupata*: 12, dorsal (A) and lateral (B) view of male gonoforceps, and (C) lateral view of aedeagus.

We have not been able to locate the type of *E. obscuricornis*. The original description of *Z. smythi* was based on three specimens only one of which, it seems, is still in existence. This specimen is a female in the U.S. National Museum which we have designated as the lecto-type.

HABITS: Several of the Puerto Rican specimens are labeled as collected at light.

### Genus *Nemognatha* Illiger

There are 36 species of this genus represented on the North American mainland and 16 in South America. The species of the United States were revised recently by Enns (1956); the Mexican and Central American forms were treated by Champion (1891-1893). The South American species have received little attention and their literature is fragmentary.

The West Indian meloid fauna includes two species of *Nemognatha* representing two subgenera.

#### *Nemognatha occupata* (Blackwelder), new combination

##### FIGURE 12

*Nemognatha atripennis* Sturm, 1826, p. 72, pl. 3, fig. 26.—Borchmann, 1917, p. 166.  
*Zonitis occupata* Blackwelder, 1945, p. 481. New name for *Nemognatha atripennis* Sturm, not Say, 1823-1824, p. 306.

DESCRIPTION: Orange-yellow. Antennae, labrum, apices of mandibles, palpi, galeae, femora (except base), tibiae, and tarsi fuscous. Elytra black with a metallic blue luster, the suture and lateral margin of each elytron sometimes orange-yellow from base to apical fifth. Wings pale. Pubescence pale on pale areas, dark on elytra and fuscous area of legs. Length, 5.5-8.5 mm.

Head similar in shape to that of *N. sparsa* LeConte but more elongate; distance from top of vertex to base of labrum one-tenth to one-fifth greater than distance across tempora; vertex evenly rounded; tempora rounded, not inflated; surface smooth, shiny, coarsely, moderately densely or densely punctate; pubescence short, semirecumbent. Clypeus less coarsely, sparsely punctuate. Labrum rounded at sides and apex, not impressed at base, moderately densely punctate, hairy. Mandibles long, straight from base until abruptly curved at apex. Palpi long, slender, the labial palpi extending one segment beyond mandibles. Galeae pubescent, attaining or approaching hind coxae in repose. Antennae long,  $2\frac{3}{4}$  to 3 times as long as pronotum; segment I swollen, curved, definitely short of middle of eye; II to V subequal, as long as I; VI to X slightly shorter. Pronotum as wide as to  $\frac{1}{10}$  wider than long, widest at middle, gradually but decidedly narrowed to base, more abruptly narrowed to apex, much more hexagonal in

form than in related species; basal impressed line deep; disk impressed before middle, convex behind; surface smooth, shiny, coarsely punctate, the punctures moderately dense before middle and sparse behind, or sparse throughout; pubescence as on head. Scutellum subtruncate at apex, weakly impressed on midline. Elytra coarsely, very densely punctate, becoming scabropunctate at apical fifth; pubescence rather short, subrecumbent. Under surface of abdomen finely, moderately densely punctate, of thorax more coarsely punctate. Hind tibial spurs greatly thickened, spoon-shaped, concave behind.

Male having fifth abdominal sternum shallowly emarginate, impressed and subglabrous medially in apical half. Sixth sternum cleft, broadly impressed medianly. Genitalia as in figure 12.

Female having fifth abdominal sternum not modified. Sixth sternum feebly emarginate.

TYPE LOCALITY: Cuba.

GEOGRAPHIC DISTRIBUTION: Apparently endemic to Cuba. We have records from three definite localities on the island, all at elevations below 1,000 ft.

SEASONAL DISTRIBUTION: July 14 to September 22.

RECORDS: CUBA: near Guantánamo, C. E. Baker, USNM, four; San Germán, July 14, 1933, S. C. Bruner, USNM, one; Santiago de las Vegas, September 22, 1931, A. O. Otero, USNM, two.

REMARKS: This species is a member of the subgenus *Pronemognatha* Enns. It does not seem to be particularly close in its relationships to any one of the four species included in this subgenus by Enns (1956). Interestingly, in the characters of the male genitalia it is more similar to the three species that occur in the southwestern United States than to the geographically more approximate *N. zonitoides* Dugès from Mexico and Central America. In Enn's key *N. occupata* runs to *N. sparsa* LeConte, from which it is easily distinguished by its more densely punctate, metallic elytra, subhexagonal pronotum, and dark galeae and by several other characters, including the distinctive male genitalia.

In the two specimens from Santiago de las Vegas the elytra are rather widely margined with yellow; in the specimen from San Germán they are finely margined; and in two of the Guantánamo specimens the very edge of the suture and lateral margin of each tend to be pale.

Although the present location of the type of *N. occupata* (= *atripennis*) is unknown to us, Sturm's descriptions and figure leave no doubt as to the identity of the species. It is worth noting that *N. occupata* was not included in Gundlach's (1891) work on Cuban insects, in Leng and Mutchler's lists (1914, 1917) of West Indian Coleoptera, or in Denier's (1935) catalogue.

HABITS: Unknown.

*Nemognatha punctulata* LeConte

*Nemognatha punctulata* LeConte, 1853, p. 347.

*Nemognatha testaceiceps* Pic, 1916, p. 7. New synonymy.

*Zonitis testaceiceps*, Denier, 1935, p. 150.—Blackwelder, 1945, p. 481.

**DIAGNOSIS:** Orange-yellow. Elytra each with or without a black or fuscous vitta. Antennae (except segment I), apices of mandibles, last segment of palpi, apices of femora and tibiae, and tarsi black. Under surface varying from entirely pale to largely black or fuscous, the tip of abdomen always pale. Head with vertex tumid, tempora inflated; surface moderately coarsely, moderately densely punctate. Mandibles heavy, moderately long, curved at sides. Galeae pale, attaining hind coxae. Antennae heavy, about three times as long as pronotum; segment I attaining middle of eye. Pronotum transverse, rectangular; sides subparallel; surface sparsely or moderately densely punctate. Elytra finely, moderately densely punctate, densely microreticulate, clothed with short, semierect pubescence. Hind tibial spurs slender, acute. Male with third to fifth abdominal sterna each with a pale punctulate area medianly which is clothed with pale setae. Sixth sternum cleft and impressed in male, emarginate in female. Length 6.5–12 mm.

**TYPE LOCALITY:** Of *N. punctulata*, Georgia. Of *N. testaceiceps*, Cuba.

**GEOGRAPHIC DISTRIBUTION:** Jamaica, the Cayman Islands, Cuba, the Bahama Islands, and Southeastern United States.

**SEASONAL DISTRIBUTION:** March 15 to October 2 in the West Indies. Recorded by Enns (1956) in the United States from April 2 to September 27.

**RECORDS:** BAHAMAS: Andros Island, Lisbon Creek near South Bight, April 28, 1953, E. B. Hayden, AMNH, 1; Cat Island, Bennetts Harbour, March 24, 1953, E. B. Hayden, AMNH, 1; Great Abaco Island, Marsh Harbour, May 6, 1953, E. B. Hayden and L. Giovannoli, AMNH, 1; Gun Cay, MCZ, 1; New Providence Island, 2 miles east of Nassau, April 14, 1953, E. B. Hayden, AMNH, 1; North Bimini Island, August 2, 1951, P. and C. Vaurie, AMNH, 1; South Bimini Island, various dates from May to August 6, 1951, M. Cazier, W. Gertsch, F. Rindge, and C. and P. Vaurie, AMNH, 14. CAYMAN ISLANDS: Grand Cayman, July 7–8, 1958, M. H. Hatch, RBS, UW, 4. CUBA: Central Jaronú, May 27, 1930, L. C. Scaramusza, USNM, 1; September 6, 1934, USNM, 2; Havána, C. E. Baker, USNM, 2; Holquín, 1904, BM, 2; Las Tunas, July 16, 1933, S. C. Bruner, USNM, 1; Santiago de las Vegas, July 1916 and 1917, P. Cardin, USNM, 2; July 1951, F. de Zayas, RBS, 1; Santo Tomás, Península de Zapata, May 5–9, 1927, S. C. Bruner and J. Acuna, USNM, 1; Taco Taco, April 1–6, 1922, S. C. Bruner, J. Acuna, and C. H. Ballou, USNM, 1. JAMAICA: Bowden, October 2, 1951, C. B. Lewis, IJ, 1; Carrovannts,

August 9, 1947, C. B. Lewis, IJ, 1; 14½ miles east of Kingston, on Morant Bay Road, May 25, 1956, T. H. Farr, IJ, 5; 3 miles west-southwest of Logwood, March 25, 1955, T. H. Farr, IJ, 3; Upper Mountain View, St. Andrew Parish, March 15, 1949, C. B. Lewis, IJ, 1.

REMARKS: This species is closely related to the South American *N. nigrotarsata* Fairmaire and Germain. Its population in the south-eastern United States was treated by Enns (1956).

The elytra are more strongly microreticulate and therefore duller in specimens from the West Indies than in those from Florida with which we have compared them. All the West Indian specimens have vittate elytra. In one from Cat Island and another from Cuba, the vittae cover the elytra except for the suture and lateral margins. At the other extreme a specimen from Gun Cay and one from South Bimini Island have the vitta of each elytron reduced to a fuscous streak.

The specimens from Andros, Cat, Great Abaco, and New Providence Islands were collected by the Van Voast-American Museum of Natural History Bahama Islands Expedition, whose itinerary, together with a general account of the Bahama Islands, was given by Rabb and Hayden (1957). The remaining Bahama material was collected during a survey of the Bimini Island group, which was described by Vaurie (1952).

The lectotype of *N. punctulata* is in the Museum of Comparative Zoology. We have been unable to locate the type of *N. testaceiceps*. It is presumed to be in the collection of M. Pic, but we have been unsuccessful in our efforts to verify this.

HABITS: Several of the specimens from Jamaica were collected on flowers of the composite *Bidens pilosa* by T. H. Farr. Dr. Farr also collected one specimen that had been captured by the reduviid bug *Zelus longipes* (Linnaeus).

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